

High Speed Closed Brayton Cycle Turboalternator, Phase I

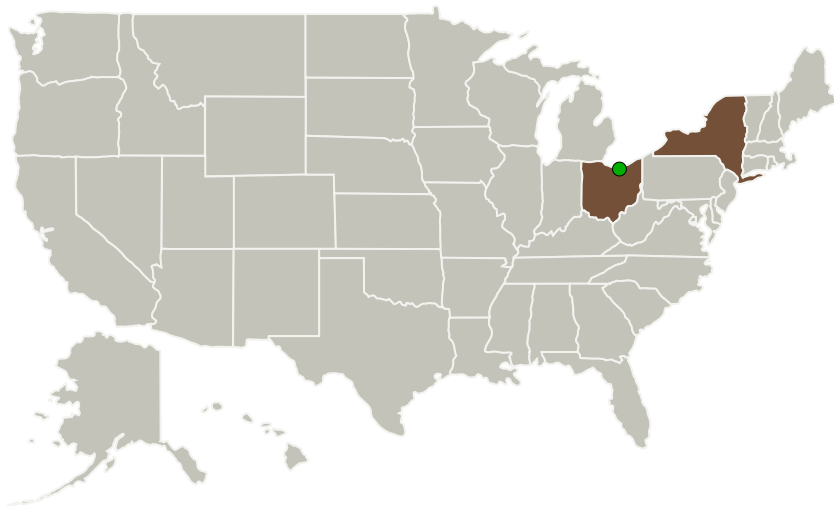
Completed Technology Project (2016 - 2016)



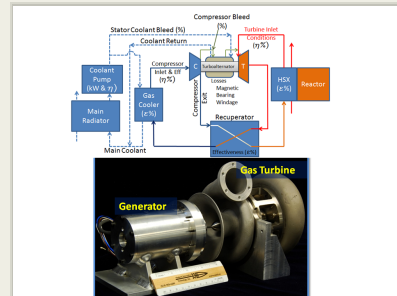
Project Introduction

A single shaft, low cost, long life, maintenance-free modular turbogenerator scalable from 1 to 100 kWe capacity range for human exploration of the moon and Mars is proposed. Operating at high spin speeds and based on a closed Brayton cycle using a binary He-Xe working fluid, the device combines five key enabling technologies to achieve high cycle and electrical efficiencies. MiTi's innovation is the seamless integration of 1) MiTi's Fifth Generation low power loss; high load, damping and temperature foil bearings with high reliability and long life; 2) a modular configuration that isolates the alternator elements from high temperature for improved thermal management; 3) a high efficiency direct drive permanent magnet high-speed alternator; 4) high adiabatic efficiency aero components; and 5) high effectiveness/low pressure drop ceramic/cermet based recuperator. The specific design has its heritage in an open Brayton cycle turboalternator with a demonstrated specific power 1.6 kW/kg.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Mohawk Innovative Technology, Inc.	Lead Organization	Industry	Albany, New York
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio



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Primary U.S. Work Locations

New York

Ohio

Project Transitions

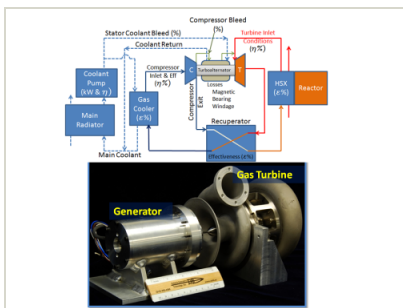
June 2016: Project Start

December 2016: Closed out

Closeout Documentation:

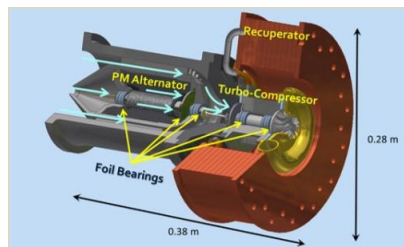
- Final Summary Chart(<https://techport.nasa.gov/file/139738>)

Images



Briefing Chart Image

High Speed Closed Brayton Cycle Turboalternator, Phase I
(<https://techport.nasa.gov/image/129573>)



Final Summary Chart Image

High Speed Closed Brayton Cycle Turboalternator, Phase I Project Image
(<https://techport.nasa.gov/image/129628>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Mohawk Innovative Technology, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

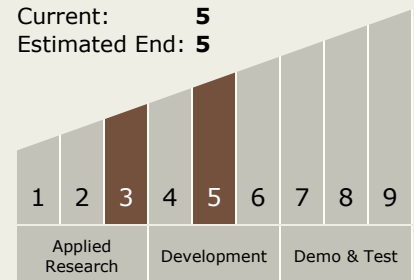
Hooshang Heshmat

Technology Maturity (TRL)

Start: **3**

Current: **5**

Estimated End: **5**



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.1 Power Generation and Energy Conversion
 - └ TX03.1.4 Dynamic Energy Conversion

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System